

Sub A2 We Claim:

1 1. A method for amplifying at least a first and second diversity-encoded signal, each  
2 of which represents information represented by a first signal to be transmitted using transmit  
3 diversity, and for amplifying a second signal to be transmitted without using transmit diversity,  
4 the method comprising the steps of:

5 sharing the amplification of the at least first and second diversity-encoded signals  
6 between at least two amplifiers; and

7 sharing the amplification of the second signal between the at least two amplifiers.

1 2. The method of claim 1, wherein the first and second sharing steps are carried out  
2 concurrently.

1 3. The method of claim 1,  
2 further comprising the step of forming at least first and second composite signals as  
3 functions of the at least first and second diversity-encoded signals; and

4 wherein the first of the sharing steps comprises the steps of:

5 amplifying the first composite signal in a first amplifier of the at least two  
6 amplifiers; and

7 amplifying the second composite signal in a second amplifier of the at least two  
8 amplifiers.

1 4. The method of claim 3,  
2 further comprising the step of forming the at least first and second composite signals as  
3 functions of the second signal; and

4 wherein the second of the sharing steps comprises the steps of:

5 amplifying the first composite signal in a first amplifier of the at least two  
6 amplifiers; and

7 amplifying the second composite signal in a second amplifier of the at least two  
8 amplifiers.

1           5.     The method of claim 3, wherein the step of forming the at least first and second  
2 composite signals is performed in the digital domain.

1           6.     The method of claim 5,  
2 further comprising the steps of:  
3                 pre-distorting the first composite signal; and  
4                 pre-distorting the second composite signal; and  
5           wherein the steps of amplifying the first and second composite signals comprise  
6 amplifying the pre-distorted first and second composite signals.

1           7.     The method of claim 1,  
2 further comprising the step of forming at least first and second composite signals as  
3 functions of the second signal; and  
4           wherein the second of the sharing steps comprises the steps of:  
5                 amplifying the first composite signal in a first amplifier of the at least two  
6 amplifiers; and  
7                 amplifying the second composite signal in a second amplifier of the at least two  
8 amplifiers.

1           8.     A method for processing at least a first diversity-encoded signal and a second  
2 diversity-encoded signal each of which represents information represented by a first signal, the  
3 method comprising the steps of:  
4                 forming at least first and second composite signals as functions of the at least first and  
5 second diversity-encoded signals;  
6                 amplifying the first composite signal in a first amplifier to produce an amplified first  
7 composite signal;  
8                 amplifying the second composite signal in a second amplifier to produce an amplified  
9 second composite signal; and

10 forming amplified first and second diversity-encoded signals as functions of at least the  
11 amplified first and second composite signals.

1 9. The method of claim 8, wherein:  
2 the amplified first diversity-encoded signal comprises an amplified phase-shifted first  
3 diversity-encoded signal; and  
4 the amplified second diversity-encoded signal comprises an amplified phase-shifted  
5 second diversity-encoded signal.

1 10. The method of claim 8, wherein:  
2 the first composite signal is a function of a combination of the first diversity-encoded  
3 signal with a phase-shifted version of the second diversity-encoded signal; and  
4 the second composite signal is a function of a combination of the second diversity-  
5 encoded signal with a phase-shifted version of the first diversity-encoded signal.

1 11. The method of claim 8, wherein:  
2 the amplified first diversity-encoded signal is a function of a combination of the  
3 amplified first composite signal with a phase-shifted version of the amplified second composite  
4 signal; and  
5 the amplified second diversity-encoded signal is a function of a combination of the  
6 amplified second composite signal with a phase-shifted version of the amplified first composite  
7 signal.

1 12. The method of claim 8, wherein:  
2 the first composite signal is a function of a sum of the first diversity-encoded signal and  
3 of the second diversity-encoded signal; and  
4 the second composite signal is a function of a difference between the first diversity-  
5 encoded signal and the second diversity-encoded signal.

1 13. The method of claim 8, wherein:

2 the amplified first diversity-encoded signal is a function of a sum of the amplified first  
3 composite signal and the amplified second composite signal; and

4 the amplified second diversity-encoded signal is a function of a difference of the  
5 amplified first composite signal and the amplified second composite signal.

1 14. The method of claim 8, further comprising the steps of:

2 transmitting the amplified first diversity-encoded signal over a first antenna; and

3 transmitting the amplified second diversity-encoded signal over a second antenna.

1 15. The method of claim 8, further comprising the steps of:

2 forming the at least first and second composite signals as functions of a second signal;

3 and

4 forming an amplified second signal as a function of at least the amplified first and second  
5 composite signals.

1 16. The method of claim 8, wherein the step of forming the at least first and second  
2 composite signals is performed in the digital domain.

1 17. The method of claim 16,

2 further comprising the steps of:

3 pre-distorting the first composite signal; and

4 pre-distorting the second composite signal; and

5 wherein the steps of amplifying the first and second composite signals comprise  
6 amplifying the pre-distorted first and second composite signals.

1 18. A transmitter comprising:

2 a first device for forming at least a first and second composite signals as functions of at  
3 least first and second diversity-encoded signals, the first and second diversity-encoded signal  
4 representing information represented by a first signal;

5 a first amplifier having an input coupled to the first device, the amplifier amplifying the  
6 first composite signals to produce an amplified first composite signal;

7 a second amplifier having an input coupled to the first device, the amplifier amplifying  
8 the second composite signal to produce an amplified second composite signal; and

9 a second device having a first input coupled to an output of the first amplifier and having  
10 a second input coupled to an output of the second amplifier, the second device for forming  
11 amplified first and second diversity-encoded signals as functions of at least the amplified first  
12 and second composite signals.

1 19. The transmitter of claim 18, wherein the first device comprises:  
2 channel processing circuitry; and  
3 at least one radio for forming the first and second composite signals.

1 20. The transmitter of claim 18, wherein  
2 the first device comprises:  
3 channel processing circuitry;  
4 at least one radio; and  
5 a first hybrid combiner having an input coupled to an output of the radio, a first  
6 output coupled to the first amplifier, and a second output coupled to the second amplifier, the  
7 first hybrid combiner forming the first and second composite signals; and  
8 the second device comprises a second hybrid combiner having a first input coupled to the  
9 first amplifier, and a second input coupled to the second amplifier.

1 21. The transmitter of claim 20, wherein the first and second hybrid combiners  
2 comprise 90° hybrid combiners.

1 22. The transmitter of claim 18, wherein:  
2 the first device further comprises a digital predistorter having an output coupled to the  
3 first and second amplifiers, the digital predistorter pre-distorts the first composite signal and the  
4 second composite signal;

5 the first amplifier amplifies the pre-distorted first composite signal to produce the  
6 amplified first composite signal; and

7 the second amplifier amplifies the pre-distorted second composite signal to produce the  
8 amplified second composite signal.

1 23. The transmitter of claim 18, wherein:  
2 the amplified first diversity-encoded signal comprises an amplified phase-shifted first  
3 diversity-encoded signal; and  
4 the amplified second diversity-encoded signal comprises an amplified phase-shifted  
5 second diversity-encoded signal.

1 24. An apparatus comprising:  
2 at least one antenna; and  
3 a transmitter coupled to at least one of the at least one antennas, the transmitter  
4 comprising:  
5 a first device for forming at least a first and second composite signals as functions  
6 of at least first and second diversity-encoded signals, the first and second diversity-encoded  
7 signal representing information represented by a first signal;  
8 a first amplifier having an input coupled to the first device, the amplifier  
9 amplifying the first composite signals to produce an amplified first composite signal;  
10 a second amplifier having an input coupled to the first device, the amplifier  
11 amplifying the second composite signal to produce an amplified second composite signal; and  
12 a second device having a first input coupled to an output of the first amplifier and  
13 having a second input coupled to an output of the second amplifier, the second device for  
14 forming amplified first and second diversity-encoded signals as functions of at least the  
15 amplified first and second composite signals.

1 25. The apparatus of claim 24, wherein the first device comprises:  
2 channel processing circuitry; and  
3 at least one radio for forming the first and second composite signals.

1           26.    The apparatus of claim 24, wherein  
2           the first device comprises:  
3                channel processing circuitry;  
4                at least one radio; and  
5                a first hybrid combiner having an input coupled to an output the radio, a first  
6           output coupled to the first amplifier, and a second output coupled to the second amplifier, the  
7           first hybrid combiner forming the first and second composite signals; and  
8           the second device comprises a second hybrid combiner having a first input coupled to the  
9           first amplifier, and a second input coupled to the second amplifier.

1           27.    The apparatus of claim 26, wherein the first and second hybrid combiners  
2           comprise 90° hybrid combiners.

1           28.    The apparatus of claim 24, wherein:  
2           the first device further comprises a digital predistorter having an output coupled to the  
3           first and second amplifiers, the digital predistorter pre-distorts the first composite signal and the  
4           second composite signal;  
5           the first amplifier amplifies the pre-distorted first composite signal to produce the  
6           amplified first composite signal; and  
7           the second amplifier amplifies the pre-distorted second composite signal to produce the  
8           amplified second composite signal.

1           29.    The apparatus of claim 24, wherein:  
2           the amplified first diversity-encoded signal comprises an amplified phase-shifted first  
3           diversity-encoded signal; and  
4           the amplified second diversity-encoded signal comprises an amplified phase-shifted  
5           second diversity-encoded signal.

1           30.    The apparatus of claim 24, wherein the apparatus includes at least two antennas  
2           and the transmitter is coupled to at least two of the antennas.

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- 1            31.    The apparatus of claim 24, wherein the apparatus further comprises a receiver  
2    coupled to at least one of the antennas.

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